User Models:

Speller with word-completion/prediction

Sudhakaran Jain, Arnout Van Heereveld, Rohit Mandyam

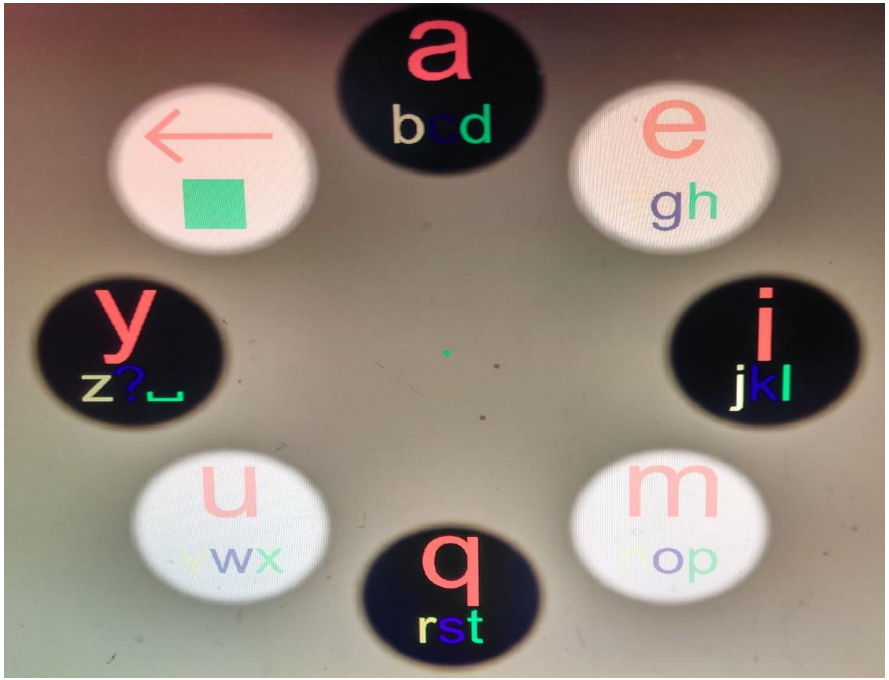
What it does

- 3 word suggestions based on a letters chosen by traditional speller or previous words chosen by user (using 5-grams).
- User can select the intended word using eye blinks. Spaces are added after the word is appended.
- If a word is chosen or completed, suggestions for the next word will be shown
- If the intended word was not present in the suggestions, the user can move on to type the next letter and so on..

How it works

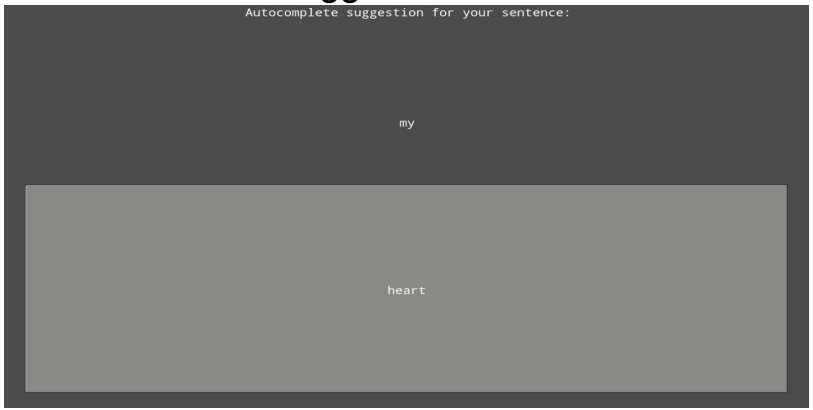
- List of frequently used words arranged in priority.
- Parse through the list to find appropriate suggestions for the letter.
- Respective priority value is increased if a suggested word is chosen.
- For previous words in sentence, 5-gram list is parsed to suggest next intended word.
- New/unknown words typed are added to word list to improve suggestions in future.

How it looks



Traditional Speller

Word suggested for letter ‘m’



Word predictions using 5-grams

Aim of proposed system

- Faster sentence completion
- Improved personal user experience
- Lesser typo errors

Hypothesis:

- Largest timesave believed to be because of keeping speller to the minimum
- Expected amount of steps in traditional speller: 17
- Expected amount after upgrade: 8 (+ selection menus)
- Expected improvement: ~50%

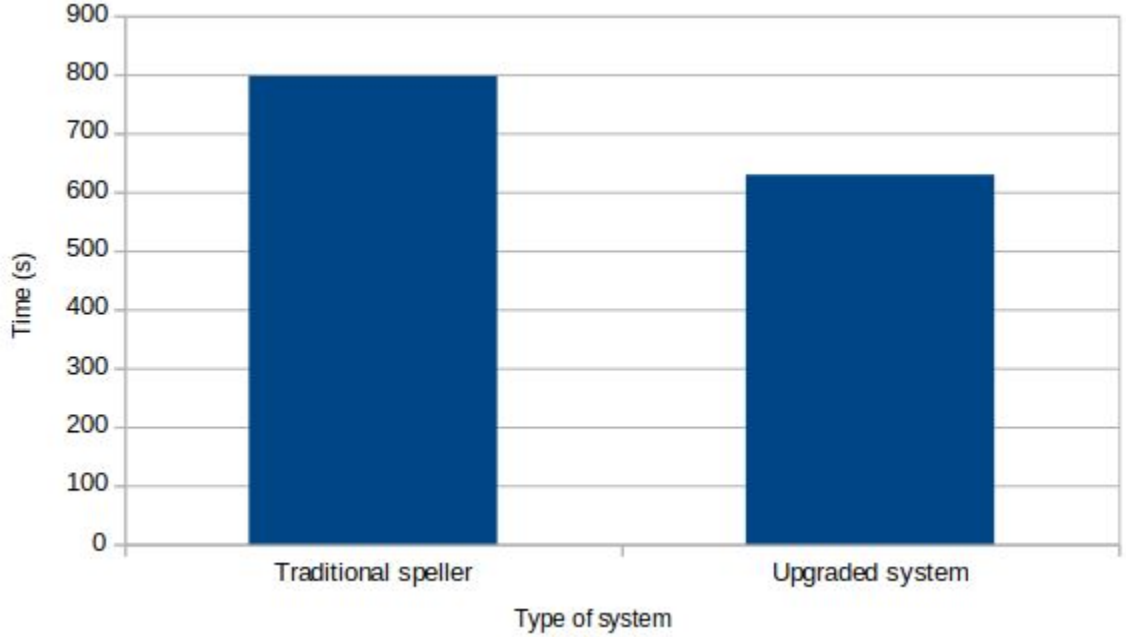
Experiment:

- Write the sentence “my name is lisa”
  - Traditional Speller
  - Our upgraded System
- Compare the time it takes to complete this sentence

Participants:

- 7 Subjects
- Students from RuG
- Data from 3 subjects was discarded
  - Participants were unable to complete the task
  - Participants became frustrated

Results



Avg time taken by traditional speller: 797.4 seconds

Avg time taken by our system: 629.2 seconds

Overall improvement: Around **21%**

Conclusion

- Overall, our system led to faster task completion
- We were able to reliably distinguish between normal and intentional blinks
    - However; Looking away also classified as an intentional blink
- Blink detection proves to be a fast method for word selection
- Improvements were there, but not as high as expected

Discussion

- Fetching suggestions took more time than expected
- Participants had trouble using the traditional speller
  - Check for fixation was dropped
  - Average error rate of 10%
- Some participants became frustrated because of the impact of errors
- Error handling needs to be improved
  - Erroneous blinks especially are detrimental
- Verification could also be considered as a fail-safe
- Only 5-grams used in the final version
- The system cannot be easily used by anyone
  - Large individual differences in performance

Future work

- Other ngrams to be incorporated
- Find optimal parameters for updating repositories according to use
- Optimizing the amount of time suggestions are shown
- Prevent wrongful blink classifications when user is looking away
- Improve the delete function

Thank You!